

CLAIMS

What is claimed is:

- 1 1. A magnetic sensor, comprising
2 a first magnetic shield layer, having a raised portion and first and second
3 laterally opposed recessed portions extending laterally there from;
4 a magnetoresistive sensor formed above said raised portion of said first
5 magnetic shield layer, said magnetoresistive sensor having an anti-parallel
6 coupled self pinned layer, and having a free magnetic layer; and
7 first and second compressive layers formed above said first and second
8 recessed portions of said shield.
- 1 2. A magnetic sensor as in claim 1, wherein said anti-parallel pinned layer includes
2 first and second ferromagnetic layers having a positive magnetostriction separated
3 by anti-parallel coupling layer, and wherein pinning of said self pinned layer is
4 assisted by a combination of magnetostriction and magnetostatic coupling
5 between said first and second ferromagnetic layers.
- 1 3. A magnetic sensor as in claim 1, wherein said self pinned layer is pinned without
2 the assistance of exchange coupling to an antiferromagnetic material.

- 1 4. A magnetic sensor as in claim 1 wherein said first and second compressive layers
2 comprise Cu.
- 1 5. A magnetic sensor as in claim 1 further comprising first and second metallic
2 layers formed over said first and second layers of hard magnetic material.
- 1 6. A magnetic sensor as in claim 5 wherein said first and second metallic layers
2 comprise Rh.
- 1 7. A magnetic sensor as in claim 1 further comprising first and second hard
2 magnetic layers formed above said recessed portions of said shield, said first and
3 second hard magnetic material layers comprising CoPt, and further comprising
4 first and second CrMo seed layers.
- 1 8. A magnetic sensor as in claim 1 further comprising first and second hard
2 magnetic layers formed above said recessed portions of said shield, said first and
3 second hard magnetic material layers comprising CoPtCr and further comprising
4 first and second Cr seed layers.
- 1 9. A magnetic sensor as in claim 1 wherein said first and second compressive layers
2 each have a thickness of at least 200 angstroms.

- 1 10. A magnetic sensor as in claim 1 wherein said first and second compressive layers
2 each have a thickness of at least 750 angstroms.
- 1 11. A magnetic sensor as in claim 1 further comprising an insulating layer disposed
2 between said anti-parallel pinned layer and said free magnetic layer.
- 1 12. A magnetic sensor as in claim 1 further comprising an electrically conductive
2 layer disposed between said anti-parallel pinned layer and said free magnetic
3 layer.
- 1 13. A magnetic sensor as in claim 1 wherein said first and second ferromagnetic
2 layers comprise a material having a positive magnetostriction.
- 1 14. A magnetic sensor as in claim 1 wherein said shield layer is in electrical
2 communication with said anti-parallel pinned layer.
- 1 15. A magnetic sensor as in claim 1 further comprising an electrically insulating layer
2 disposed between said shield and said anti-parallel pinned layer.
- 1 16. A magnetic sensor as in claim 1 wherein at least one of said ferromagnetic layers
2 of said pinned layer comprises CoFe.

1 17. A magnetic sensor as in claim 1 wherein said first and second compressive layers
2 have a thickness of at least 17 angstroms.

1 18. A magnetic sensor as in claim 1 further comprising:
first and second hard magnetic bias layers formed above said first and second
compressive layers; and
third and fourth compressive layers formed above said first and second hard bias
layers.

1 19. A magnetic sensor as in claim 18, wherein said third and fourth compressive
2 layers comprise Rh.

1 20. A data storage system, comprising:
2 a motor connected with said housing;
3 a spindle connected with said motor;
4 a magnetic disk supported upon said spindle for rotation about its own axis;
5 an actuator; and
6 a slider supported by said actuator for pivotal motion across a surface of said disk;
7 a magnetic sensor formed on said slider, said magnetic sensor comprising:
8 a first magnetic shield layer, having a raised portion and first and second
9 laterally opposed lower portions extending laterally there from;

10 a magneresistive sensor formed above said raised portion of said first
11 magnetic shield layer, said magetoresistive sensor having an anti-parallel
12 coupled self pinned layer, and having a free magnetic layer; and
a first and second compressive layers formed above said first and second
laterally opposed lower portions of said shield.